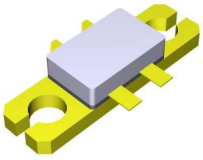
SR3010V GaN TRANSISTOR

Document Number: SR3010V
Preliminary Datasheet V1.0

GaN HEMT 28V 60W, 2GHz RF Power Transistor

SR3010V



Description

The SR3010V is a 60W, push pull configured GaN HEMT, designed for multiple applications with frequencies up to 2GHz.There is no guarantee of performance when this part is used in applications designed Outside of these frequencies.

- Typical CW performance (on Innogration broadband fixture with device screwed)

Frequency(MHz)	Voltage(V)	Gp (dB)	P_{Sat}(W)	Efficiency (%)
30-678	28	13.5-17	32-63	52-67
	32	14.5-18	40-75	50-65

Applications and Features

- Suitable for wireless communication infrastructure, wideband amplifier, EMC testing, ISM etc.
- High Efficiency and Linear Gain Operations
- Thermally Enhanced Industry Standard Package
- High Reliability Metallization Process
- Excellent thermal Stability and Excellent Ruggedness
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

Important Note: Proper Biasing Sequence for GaN HEMT Transistors

Turning the device ON

1. Set VGS to the pinch--off (VP) voltage, typically –5 V
2. Turn on VDS to nominal supply voltage (28V)
3. Increase VGS until IDS current is attained
4. Apply RF input power to desired level

Turning the device OFF

1. Turn RF power off
2. Reduce VGS down to VP, typically –5 V
3. Reduce VDS down to 0 V
4. Turn off VGS

Table 1. Maximum Ratings (Not simultaneous, TC = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain--Source Voltage	V_{DSS}	150	Vdc
Gate--Source Voltage	V_{GS}	-10,+2	Vdc
Operating Voltage	V_{DD}	40	Vdc
Maximum Forward Gate Current	Igmax	15	mA
Storage Temperature Range	Tstg	-65 to +150	°C
Case Operating Temperature	T_C	+150	°C
Operating Junction Temperature(See note 1)	T_J	+225	°C
Total Device Power Dissipation (Derated above 25°C, see note 2)	Pdiss	80	W

1. **Continuous operation at maximum junction temperature will affect MTTF**
2. **Bias Conditions should also satisfy the following expression: Pdiss < (Tj – Tc) / RJC and Tc = Tcase**

Table 2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case T_C= 85°C, T_J=200°C, DC Power Dissipation(See note 1)	$R_{\theta JC\text{-}DC}$	1.9	C/W

1. **$R_{\theta JC\text{-}DC}$ is tested at only DC condition, it is related to the highest thermal resistor value among all test conditions. It might be differently lower in different RF operation conditions like CW signal ,pulsed RF signal etc.**

Table 3. Electrical Characteristics (T_C = 25℃ unless otherwise noted)

DC Characteristics

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=-8V; I_{DS}=15mA	V_{DSS}	150			V
Gate Threshold Voltage	V_{DS} = 28V, I_D = 15mA	V_{GS}(th)		-3.3		V
Gate Quiescent Voltage	V_{DS} =28V, I_{DS}=100mA, Measured in Functional Test	$V_{GS(Q)}$		--3.15		V

Functional Tests (In Innogration broadband Test Fixture, 50 ohm system) : V_{DD} = 28 Vdc, I_{DQ} = 100 mA, f = 1000 MHz, CW

Characteristic	Symbol	Min	Typ	Max	Unit
Power Gain@ P_{Sat}	Gp		16		dB
Drain Efficiency @ P_{sat}	Eff	65	70		%
Saturated power	P_{SAT}		60		W
Input Return Loss	IRL		-7		dB
Mismatch stress at all phases (Device no damage)	VSWR		10:1		Ψ

Figure 2: Median Lifetime vs. Channel Temperature

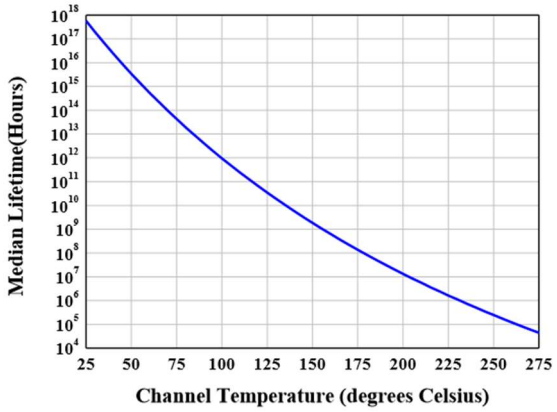


Table 4: IM3 test with 2-tone spacing 2MHz across the 30-678MHz @Pout=42dBm

Freq(MHz)	Pin(dBm)	Pav(dBm)	Pav(W)	IDS(A)	Gain(dB)	Eff(%)	IMD3
30	23	42	15.8	1.26	19	39.3	-30
60	22.5	42	15.8	1.23	19.5	40.3	-30
100	23	42	15.8	1.29	19	38.4	-31
150	23	42	15.8	1.4	19	35.4	-30
200	23.6	42	15.8	1.49	18.4	33.2	-32
250	20.7	42	15.8	1.6	21.3	31.0	-34
300	21	42	15.8	1.67	21	29.7	-33
350	23	42	15.8	1.67	19	29.7	-33
400	23	42	15.8	1.55	19	32.0	-32
450	23	42	15.8	1.29	19	38.4	-32
500	23.2	42	15.8	1.39	18.8	35.6	-32
550	22.5	42	15.8	1.31	19.5	37.8	-35
600	21.8	42	15.8	1.29	20.2	38.4	-34
650	22.5	42	15.8	1.44	19.5	34.4	-33
678	25.6	42	15.8	1.61	16.4	30.8	-32

Figure 4: Network analyzer output, S11 and S21（ VDS=28V VGS=-3.15V IDQ=200mA）

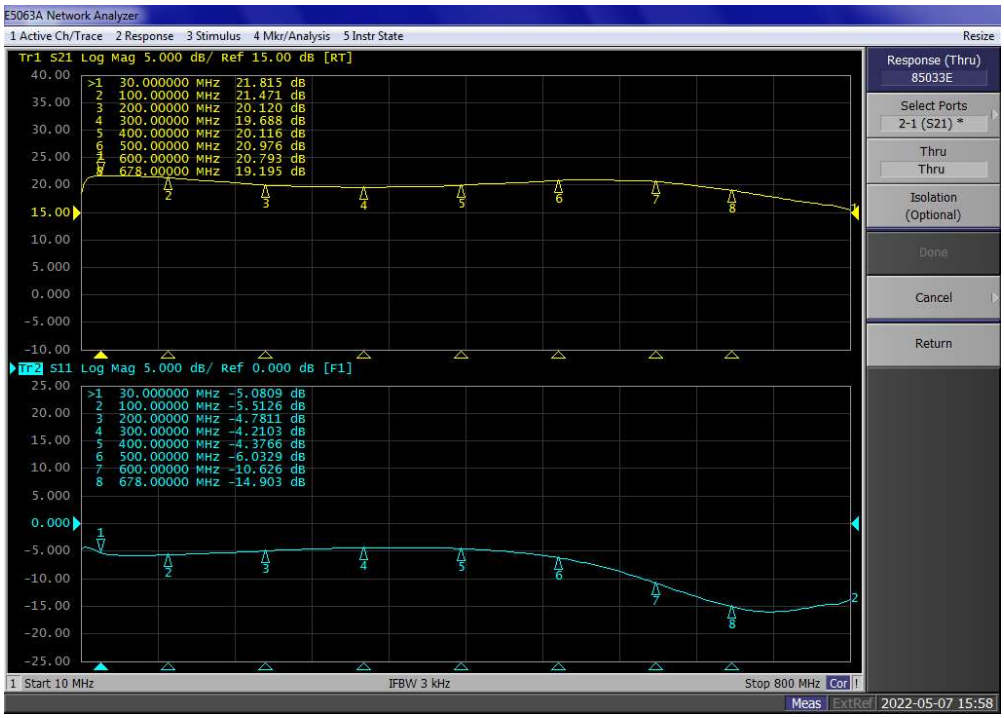


Figure 5: Picture of application board 30-678MHz class AB

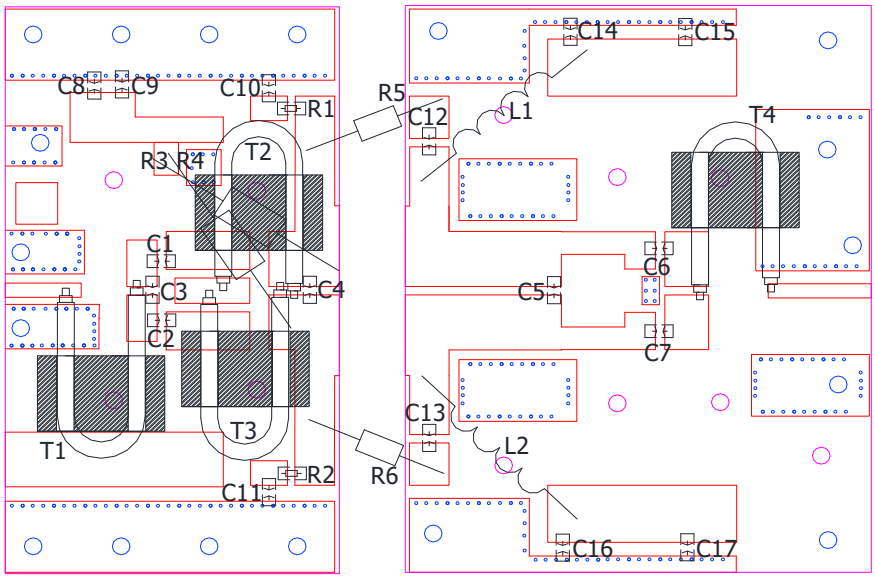


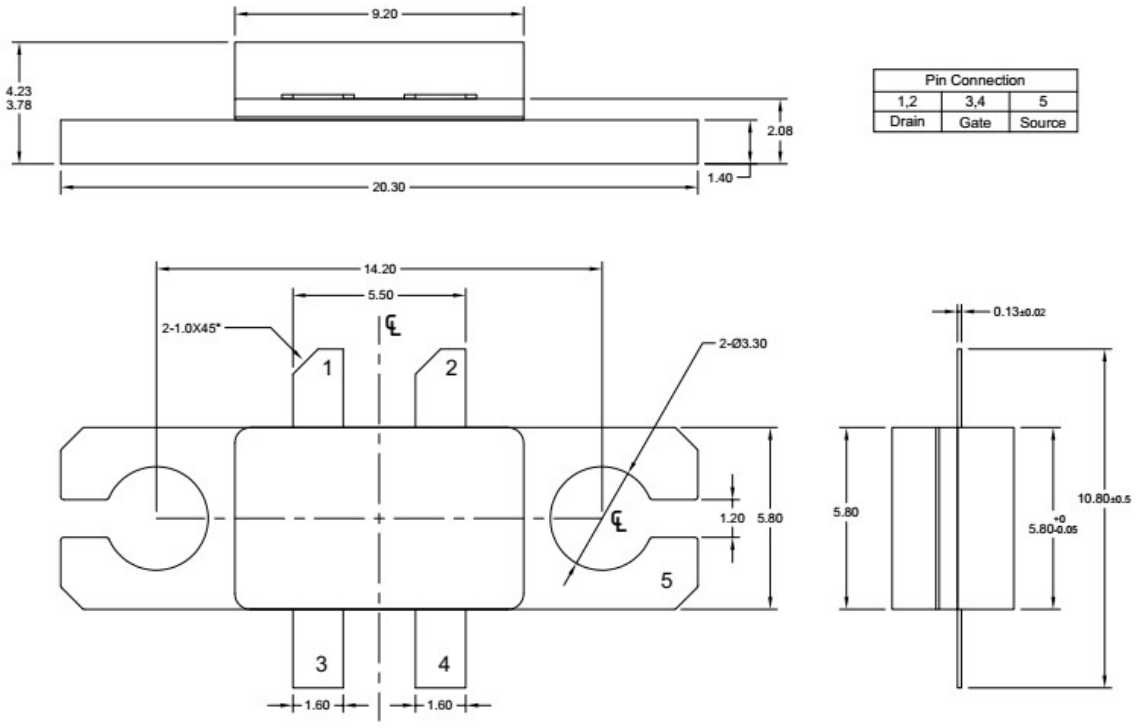
Table 5. Bill of materials of application board (RO4350B 30mils, PCB layout upon request)

Component	Description	Suggested type
C1,C2,C6,C7,C12,C13,C14,C16	10nF	1812
C3	1pF	DLC70B
C4	3pF	DLC70B
C5	3.9pF	DLC70B

C9	300pF	DLC70B
C8,C10,C11,C15,C17	10uF	10uF/50V
R1,R2	68Ω	0805
R3,R4	1000Ω	1W/1000Ω
R5,R6	760Ω	
T1	50Ω,70mm	RG047-1,BN-61-2402
T2,T3	25Ω,70mm	SFF-25-1.5,BN-61-202
T4	25Ω,75mm	SFF-25-1.5,BN-61-202
L1,L2	280nH	Manually made

Package Outline

Flanged ceramic package; 2 mounting holes; 4 leads



OUTLINE VERSION	REFERENCE			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
PKG-G4E					2018/01/19

Figure 1. Package Outline PKG-G4E

Revision history

Table 4. Document revision history

Date	Revision	Datasheet Status
2022/5/7	V1.0	Preliminary Datasheet

Application data based on ZL-22-07

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